

**The Louisiana Department of Environmental Quality's
Decision Document
For the
Final Remedy
Of
Bayou Trepagnier
Middle and Lower Reach (Operable Unit 2)
Agency Interest #44765**

Section 1. Introduction

In the spring of 2001, the Secretary of the Louisiana Department of Environmental Quality (LDEQ) initiated the Bayou Trepagnier Work Group (Work Group). The Work Group included representatives from several federal agencies (National Oceanic and Atmospheric Administration, U. S. Fish & Wildlife Service, and U. S. Army Corps of Engineers (USACE)); state agencies (Louisiana Department of Wildlife and Fisheries and Louisiana Department of Natural Resources); local non-governmental organizations (Coalition to Restore Coastal Louisiana and Lake Pontchartrain Basin Foundation); and Motiva Enterprises, LLC (Motiva). The purpose of the Work Group was 1) to evaluate the remediation alternatives for Bayou Trepagnier and recommend the remediation alternative that best reduces potential risk to the area and 2) to assess the natural resource damages in Bayou Trepagnier and the surrounding area through the Natural Resource Damage Assessment (NRDA) process and to evaluate alternatives for a Restoration/Compensation Plan.

Bayou Trepagnier is divided into three reaches: the Upper Reach, the Middle Reach and the Lower Reach. In 2007, LDEQ issued Motiva a Decision Document that addressed Remedial Action for the Upper Reach of Bayou Trepagnier known as Operable Unit 1 (OU1). The Remedial Action for OU1 included the stabilization and capping of contaminated sediments, and the construction of a Clean Corridor that would have the potential to allow freshwater to be conveyed into the LaBranche Wetlands. In 2008, Motiva and LDEQ entered into a Cooperative Agreement that outlined the 1) outlined Remedial Design and Remedial Action for OU1 and 2) required a site investigation and an updated Human Health and Ecological Risk Assessment for the middle and lower reaches of Bayou Trepagnier, identified as Operable Unit 2 (OU2).

In accordance with LAC 33:VI.511, this Decision Document (DD) was prepared to address LDEQ's proposed Final Remedy decision for Bayou Trepagnier's Middle and Lower Reach (OU2) and all other OU1 media (i.e. dredge spoils and adjacent wetland soils outside of the Clean Corridor) not included in the OU1 Remedial Action. The DD also describes the site, outlines the investigations conducted, and discusses the results of the risk evaluation.

Public Notices of the Draft DD were published on July 1, 2010 in *The Advocate* of Baton Rouge and the *St. Charles Herald Guide* of St. Charles Parish.^{1 2} The public comment period ended August 17, 2010. A request was submitted to LDEQ for an extension to the original public comment period. An extension was granted and Public Notices were published on August 19, 2010 in the same newspapers. The extended public comment period ended on August 31, 2010.

The Public Comment Period afforded the public and all interested persons the opportunity to comment on the Draft Decision Document.

¹ See Public Notice, *The Advocate*, July 1, 2010 (EDMS Document No. 48118906)

² See Public Notice, *St. Charles Herald Guide*, July 1, 2010 (EDMS Document No. 48953374)

Copies of the DDD and the RECAP MO-3 Report were available for review at the LDEQ Public Records Center, Room 127, 602 North 5th Street, Baton Rouge, LA. These documents were also available electronically in the LDEQ Electronic Document Management System (EDMS).³

Additional copies of the DDD were also available for review at the St. Charles Parish Library, Norco Branch, 197 Good Hope Street, Norco, LA 70079, and at the East Regional Branch, 100 River Oaks Drive, Destrehan, LA 70047.

The LDEQ received written comments during the public comment period. The LDEQ has provided a response to the comments received in a separate document. This is the Final Decision Document of the LDEQ.

Section 2. Background

Bayou Trepagnier is located to the east of the Bonnet Carré lower guide levee, north of Airline Highway (U.S. 61) near Norco, approximately 10 miles west of New Orleans. The New Orleans Refining Company (NORCO) facility is located on US Highway 61. The NORCO refining facility began operating in 1920. NORCO discharged wastewater and storm water into Bayou Trepagnier from 1920 until 1929, when Shell Petroleum Corporation (Shell) purchased the facility and began its operation. In 1930 the USACE constructed the Bonnet Carré Spillway. The Spillway's lower guide levee eliminated the upper portion of Bayou Trepagnier. Shell, like its predecessor also discharged wastewater and storm water into Bayou Trepagnier. In 1951 the Louisiana Department of Public Works dredged Bayou Trepagnier. The dredged sediments were placed in spoils banks, primarily along the west side of the Bayou. The refinery ceased discharge into the Bayou Trepagnier in 1995. Motiva Enterprises, LLC, the successor corporation to Shell, (Motiva) has owned and operated the facility since 1998.

Bayou Trepagnier extends approximately 15,500 feet northward from the Hurricane Protection Levee (HPL) to its confluence with Bayou LaBranche. The width of the Bayou varies from approximately 25 to 60 feet, being generally narrower in the upper reach and wider in portions of the lower reach. Bayou LaBranche flows northwesterly for about one mile from its junction with Bayou Trepagnier before emptying into Lake Pontchartrain. A man-made canal connects Engineer's Canal to Bayou LaBranche, entering Bayou LaBranche south of the Interstate 10/Bayou LaBranche cross-over.

For ease of reference, Bayou Trepagnier is divided into Stations consisting of approximate 100 foot linear segments along the centerline of the Bayou beginning with the hurricane protection levee (HPL) and running northward to the Bayou LaBranche confluence.

Bayou Trepagnier is hydrologically connected to the adjacent wetland. Flow in the Bayou is dominated by tidal and wind-driven water level fluctuations in Lake Pontchartrain. Water in the Bayou is fresh to mildly brackish. The Bayou is divided into three reaches:

- **The Upper Reach**—extends approximately 5,500 feet from the HPL northward to a narrow "Cut" which connects the Bayou to Engineer's Canal; this reach is partly a man-made canal (Stations 5 to 60.5);

>Note: A Subunit of the Upper Reach is designated as the Clean Corridor (Stations 5-13). The sediments and spoil banks in this area will be removed as part of the Remedial Action for Operable Unit 1;

³EDMS is the abbreviation for Electronic Document Management System, the LDEQ's electronic repository of official records that have been created or received by LDEQ. Employees and members of the public can search and retrieve documents stored in the EDMS via this web application (see <http://edms.deq.louisiana.gov/app/doc/querydef.aspx>).

- **The Middle Reach**—extends approximately 5,500 feet from the “Cut” northward (Stations 60.5- 115); and
- **The Lower Reach**—extends about 4,500 feet from the north end of the Middle Reach to the confluence with Bayou LaBranche (Stations 115-160).

For the purposes of this DDD, OU2 includes the sediments, eastern edge dredge spoils, and adjacent soils of the Middle and Lower Reaches and all other OU1 media (i.e. dredge spoils and adjacent wetland soils outside of the Clean Corridor) not included in the OU1 Remedial Action.

Bayou Trepagnier banks are covered with typical second-growth wetland forest. Cypress-Tupelo swamp, marsh, and open water areas exist between Bayou Trepagnier and Bayou LaBranche. Articles appear occasionally in the popular press on recreational use of Bayou Trepagnier for canoeing, boating, birding, wildlife observation, and photography. Public access to Bayou Trepagnier is limited to small boat transport. Small motorized jon boats can be launched at Engineer’s Canal near the man-made canal connecting to Bayou LaBranche; while canoes can be launched at many points along Engineer’s Canal, including across from the Cut. The only land access to Bayou Trepagnier is via the HPL, from which the public is restricted from using.

Bayou Trepagnier is part of the LaBranche wetlands, and is designated a Louisiana Natural and Scenic Stream. It is also within the coastal zone delineation and therefore regulated under Louisiana State and Local Coastal Resources Management Act of 1978.

Previous investigations and risk assessments conducted at Bayou Trepagnier identified several constituents of concern (COCs) and risks associated with human and ecological exposure. These studies found concentrations of several COCs above typical background levels (e.g., lead, chromium, zinc, and individual polycyclic aromatic hydrocarbons [PAHs]) in the sediments and surrounding soils.

In April 1999, the LDEQ directed Motiva to re-evaluate the human health portion of the risk assessment for Bayou Trepagnier. The assessment was to be conducted in accordance with Risk Evaluation/Corrective Action Program (RECAP) Regulations (LAC 33:1.Chapter 13). In response to the LDEQ’s request, a revised risk assessment prepared by Groundwater Services, Inc. was submitted in December 1999.

The 1999 risk assessment concluded that no unacceptable human health non-cancer or cancer risks were identified above suggested guideline limits for site constituents (excluding lead). Acceptable target risk levels were defined by RECAP as within the range of 10^{-4} to 10^{-6} for carcinogenic constituents; with a hazard index of less than or equal to 1 for non-carcinogenic constituents; or with a 95th percentile blood lead level of less than or equal to 10 ug/dL.

Blood lead level risks for adults and children were assessed separately using the Adult Lead model and the Integrated Exposure Uptake Biokinetic (IEUBK) model for child lead exposure. The results from these assessments showed slightly elevated predicted lead concentrations in blood (greater than 10 ug/dL) for an adult person crabbing and eating his catch. A higher modeled blood lead level was found for a child crabbing, fishing and eating the catch. These risks characterizations for lead exposure were qualified on the basis of very conservative (high) crab consumption factors and the limited number of crab and fish lead tissue data.

In response to public concerns and a growing need to address the environmental issues of Bayou Trepagnier, several key elements for the remedial and natural resource restoration were established by the Work Group:

- Division of remedial work in Bayou Trepagnier by dividing the area into OU1 and OU2
- Complete a Remedial Action in OU1 to reduce potential exposure risk due to contaminated sediments;
- Construct a Clean Corridor in OU1 to allow for the potential future conveyance of fresh water to the wetland ecosystem;
- Complete an updated Human Health and Ecological Risk Assessment for OU2 and portions of OU1 not included in the Operable Unit 1 Remedial Action; and

- Complete a NRDA Damage Assessment and Restoration Plan (DARP) for Bayou Trepagnier incorporating the necessary elements and supporting documents for wetland restoration

Section 3. Cooperative Agreement Requirements for OU2

LDEQ and Motiva entered into a Cooperative Agreement (Agreement) in February of 2008, which required Motiva to perform a comprehensive assessment of the potential human health and ecological risk posed by the sediments and soils found in OU2 and portions of OU1 for the purpose of determining whether the physical and biological media found at Bayou Trepagnier posed an unacceptable risk level to human health or the ecological system such that remedial action would be needed. The Agreement required the implementation of an OU2 Site Investigation Work Plan (OU2 Work Plan) which adhered with the Risk Evaluation/Corrective Action Program (RECAP) Management Option-3 (MO-3) requirements.

The OU2 Work Plan, which was approved by the LDEQ before implementation, outlined the areas to be addressed and established the types of sampling and analysis to be utilized. Specifically, the OU2 Work Plan addressed the following sections of Bayou Trepagnier: the sediments, dredge spoils, and adjacent soils of OU2; and all other OU1 media (i.e. dredge spoils and adjacent wetland soils outside of the Clean Corridor) not included in the OU1 Remedial Action. The OU2 Work Plan required that physical (sediment, soil, and surface water) and biological (plant and animal tissue) media from these areas be sampled and analyzed. On completion of all analysis required by the OU2 Work Plan, Motiva was required to submit an MO-3 RECAP Report to the LDEQ for approval. The MO-3 RECAP Report contains an updated Human Health Risk Assessment (HHRA) and an Ecological Risk assessment (ERA). The Ecological Risk Assessment reflects current LDEQ and USEPA methodologies, updates ecological toxicity reference values, provides a wider variety of trophic guilds (receptor types/groups), and demonstrates recently developed methods for estimating exposures.

Motiva has complied with the requirements of Section VI Part A of the Cooperative Agreement section regarding OU2. The following document submittals and action dates represent work completed for OU2.

Cooperative Agreement Signed	08/06/2007
Motiva Submitted MO-3 RECAP Investigation Work Plan (Rev. 0)	02/14/2008
Comment Submitted by LDEQ on MO-3 Work Plan	05/19/2008
Motiva Submitted Revised MO-3 RECAP Investigation Work Plan (Rev. 1)	06/20/2008
Approval of MO-3 RECAP Investigation Work Plan (revised)	07/15/2008
Start of OU2 Investigation Sampling	09/29/2008
Completion of OU2 Investigation Sampling	11/18/2009
Motiva Submitted RECAP MO-3 Report (Rev. 0)	03/18/2009
LDEQ Commented on RECAP MO-3 Report	05/14/2009
Motiva Submitted Revised RECAP MO-3 Report (Rev. 1)	07/15/2009
LDEQ Review/Comment on Revised MO-3 RECAP Report	10/19/2009
Motiva Submitted Revised MO-3 RECAP Report (Rev. 2)	11/20/2009
LDEQ Review and Final Approval of MO-3 RECAP Report	01/21/2010

Section 4: RECAP MO-3 Report Description and Summary

The objective of the RECAP MO-3 Risk Evaluation was to perform a site-specific, integrated human health and ecological risk assessment, incorporating information gained from soil, water, sediment, and tissue data collected from the site. Data was collected at numerous locations in OU2 and OU1 during fall 2008. The purpose of the risk evaluation was to determine if the residual COC concentrations in the sediments, dredge spoils, surface water, and soils of OU2 and

applicable dredge spoils and adjacent soils of OU1 (the portions of OU1 not included in the Remedial Action of OU1) were posing unacceptable risks to human health or the environment.

1. OU2 Work Plan Investigation

a. Sampling:

Several physical media samples were taken along Bayou Trepagnier. The samples were taken as follows: Eleven (11) soil samples (8 in the Upper Reach and 3 in the Middle Reach) were taken at specific locations along the spoil banks at 0-6 inches in the biologically active zone of the bayou; Five (5) soil transect locations (4 in the Upper Reach and 1 in the Middle Reach) were selected and sampled in a like manner. These samples represent soils located away from the dredge spoil banks, one positioned approximately in between the spoil bank and the bayou and two located in approximately 100 foot increments from the middle of the spoil bank westward; and Fifteen (15) sediment samples (9 in the Middle Reach and 6 in the Lower Reach) were collected with an Ekman dredge from the 0-6 inch zone of the sediment. Surface water samples were taken also from the Middle and Lower Reaches.

In addition to location-specific sampling, background sediment and surface water samples were taken at Bayou LaBranche upstream of the confluence with Bayou Trepagnier, and soil samples located east of the Hurricane Protection Levee and northern Motiva Tank Field in an undisturbed wetland area. The data collected was used to characterize background environmental conditions in the Bayou Trepagnier area to assist in the interpretation and evaluation of data collected in the OU1 and OU2 areas.

As required by the OU2 Work Plan, biological media samples were also collected. Tissue specimens from terrestrial and aquatic organisms that inhabit the Upper, Middle, and Lower Reaches of Bayou Trepagnier, such as frog, swamp rabbit, gar, forage fish, nutria, blue crab, green anole (a common lizard from the family Polycrotidae), and aquatic vegetation, were collected. The tissue samples from this trophic guild of Bayou Trepagnier were used to determine the human health and ecological risk assessment.

b. Analysis:

Chemical analyses of the physical and biological samples collected were conducted in accordance with Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846). SW-846 is specific for each analyte or group of analytes and the analyses were conducted by a laboratory accredited under LDEQ Louisiana Environmental Laboratory Accreditation Program (LELAP).

An acid volatile sulfides/simultaneously extracted metals (AVS/SEM) test was also performed to evaluate the potential toxicity of divalent metals (lead, copper, nickel, and zinc) to benthic invertebrates. The AVS/SEM test was conducted in nine locations in OU2 and four background locations in Bayou LaBranche. In addition to the AVS/SEM test, a 10-day whole-sediment toxicity test was performed with the estuarine amphipod *Leptocheirus plumulosus* at four locations in OU2 and at four background locations in Bayou LaBranche.

The analytical results for the physical media samples were as follows: twenty-two (22) semi-volatile organic compounds, four (4) volatile organic compounds, and sixteen (16) inorganics (metals). Due to the potential for bioaccumulative effects, the analytical results for the biological media samples were as follows: seventeen (17) semi-volatile organic compounds and ten (10) inorganics (metals).

2. MO-3 RECAP Report Summary and Findings

a. Human Health Risk Assessment

The Human Health Risk Assessment evaluated the potential health risks to adult and child receptors due to chemical exposure while engaged in recreational fishing and hunting activities

at Bayou Trepagnier. Specifically, the assessment evaluated potential health risks associated with exposure to the residual chemical concentrations present in the spoil bank soil (OU1 and OU2), the bayou sediment (OU2), surface water (OU2), and selected biota. The exposure scenarios evaluated were:

- Recreational fisher who consumes sport fish and comes in contact with surface water and sediment through dermal contact and incidental ingestion while fishing;
- Recreational crabber who consumes crabs and comes in contact with surface water and sediment through dermal contact and incidental ingestion while crabbing;
- Recreational nutria hunter who consumes nutria and comes in contact with spoil bank soils through dermal contact and incidental ingestion while hunting; and
- Recreational rabbit hunter who consumes swamp rabbit and comes in contact with spoil bank soils through dermal contact and incidental ingestion while hunting.

To support the exposure assessment, bayou sediment, surface water, spoil bank soil, sportfish, crabs, nutria, and rabbits were collected from the Bayou Trepagnier area, and analyzed for site-related constituents of concern (COCs). Forty-two (42) organic and inorganic (metals) constituents were evaluated for potential health risks associated with exposure to physical and biological media. Twenty seven (27) constituents were further evaluated for potential health risks associated with the consumption of sportfish, crabs, nutria, and rabbit due to the potential for these COC to bioaccumulate in biota. The data results were then used in the human health risk assessment to estimate exposure concentrations for site-related COC in physical and biological media. The exposure concentrations were integrated with site-specific and EPA-recommended exposure assumptions to quantitatively evaluate chemical exposure in Bayou Trepagnier. Exposure to these COCs was evaluated for both adult and child receptors. Exposure to lead was evaluated using EPA's Integrated Exposure Uptake Biokinetic Model for children and EPA's Adult Lead model for adults. Blood lead levels associated with exposure to lead in surface water, bayou sediment, spoil bank soils, and biota were estimated for the receptors and exposure scenarios described above.

The human health risk assessment results indicate the following:

- The total excess lifetime cancer risks for the recreational fisher who consumes sport fish and has contact with surface water and sediment while fishing are within the acceptable risk range of 1E-06 to 1E-04;
- Non-cancer health effects are not expected (total hazard indices < 1.0) for the recreational fisher (adult or child) who consumes sport fish and has contact with surface water and sediment while fishing;
- Lead exposure for the recreational fisher (adult or child) who consumes sport fish and has contact with surface water and sediment while fishing is below the acceptable blood lead level of 10 ug/dl;
- The total excess lifetime cancer risks for the recreational crabber who consumes crabs and comes in contact with surface water and sediment while crabbing are within the acceptable risk range of 1E-06 to 1E-04;
- Non-cancer health effects are not expected (total hazard indices < 1.0) for the recreational crabber (adult or child) who consumes crab and comes in contact with surface water and sediment while crabbing;
- Lead exposure for the recreational crabber (adult or child) who consumes crab and comes in contact with surface water and sediment while crabbing is below the acceptable blood lead level of 10 ug/dl;

- The total excess lifetime cancer risks for the recreational nutria hunter who consumes nutria and comes in contact with spoil bank soils while hunting are within the acceptable risk range of 1E-06 to 1E-04;
- Non-cancer health effects are not expected (total hazard indices < 1.0) for the recreational nutria hunter (adult or child) who consumes nutria and comes in contact with spoil bank soils while hunting;
- Lead exposure for the recreational nutria hunter (adult or child) who consumes nutria and comes in contact with spoil bank soils while hunting is below the acceptable blood lead level of 10 ug/dl;
- The total excess lifetime cancer risks for the recreational rabbit hunter who consumes rabbit and comes in contact with spoil bank soils while hunting are within the acceptable risk range of 1E-06 to 1E-04;
- Non-cancer health effects are not expected (total hazard indices < 1.0) for the recreational rabbit hunter (adult or child) who consumes rabbit and comes in contact with spoil bank soils while hunting; and
- Lead exposure for the recreational rabbit hunter (adult or child) who consumes rabbit and comes in contact with spoil bank soils while hunting is below the acceptable blood lead level of 10 ug/dl.

In summary, the human health risk assessment demonstrates that the health risks associated with recreational activities in Bayou Trepagnier (including the consumption of fish, crab, nutria, and rabbit) are within the acceptable range for cancer risk, non-cancer health effects, and lead exposure.

b. Ecological Risk Assessment

The Ecological Risk Assessment evaluated the potential risks to thirteen (13) selected wildlife receptors associated with exposure to chemical concentrations present in spoil bank soil (OU1 and OU2), wetland soil (OU1 and OU2), bayou sediment (OU2), surface water (OU2), and prey organisms (diet) in the Bayou Trepagnier area. The wildlife receptors evaluated included classes of mammals and birds with varying foraging habitats and feeding guilds:

Class	Foraging Habitat	Major Feeding Guild		
		Herbivores	Omnivores	Carnivores
Mammals	Mainly on spoil banks or wetland soil	Swamp Rabbit	Marsh Rice Rat	Short-tailed Shrew
	Mainly along Bayou	Nutria	Raccoon	Mink
Birds	Mainly on spoil bank or wetland soil	Mourning Dove	Prothonotary Warbler	Barred Owl
	Mainly along bayou	Not Applicable	Wood Duck; Red-winged Blackbird	Snowy Egret; Belted Kingfisher

Exposure of wildlife to site-related COCs was evaluated for: 1) direct contact exposure to environmental media; and 2) the consumption of vegetation and/or prey organisms. Spoil bank soil, surface water, bayou sediment, and wetland soil were collected and analyzed for site-related COC. The resulting data provided site-specific exposure concentrations for the quantitative evaluation of direct contact exposures for the selected wildlife receptors. COC concentrations were also determined for the potential dietary items consumed from Bayou Trepagnier. Such dietary items include the green anoles, aquatic plants, terrestrial plants, forage fish, frogs, crabs,

and rabbits. These data were used to quantitate site-specific exposure to wildlife receptors via the diet.

The results of the quantitative ecological risk assessment indicate that there are no unacceptable risks to wildlife receptors or the site ecosystem. The quantitative ecological risk assessment indicated that the site-specific exposures to the wood duck, snowy egret, mourning dove, barred owl, belted kingfisher, prothonotary warbler, red-winged blackbird, short-tailed shrew, swamp rabbit, marsh rice rat, nutria, raccoon, and mink are acceptable. All estimated exposures for these selected wildlife receptors are below the respective NOAELs (No Observable Adverse Effect Levels) (i.e., all site-specific hazard indices are less than 1.0).

Additional assessments were also conducted to further evaluate the COCs potential for adverse effects on the ecosystem. These tests included a site-specific evaluation of the bioavailability of divalent metals in sediments; sediment toxicity testing; and an evaluation of surface water quality. The results of these evaluations support the conclusion that there are no unacceptable risks to the site ecosystem.

Section 5. Selection of Final Remedy Decision and Rationale

The Bayou Trepagnier Work Group was instrumental in carrying out the required work for the Bayou Trepagnier site; however, the statutory and jurisdictional authority for the remedial response lies with the LDEQ. During the Risk Evaluation Process, the LDEQ made the following documents available to the public through the Electronic Data Management System (EDMS): draft work plans and reports, LDEQ's comment response and approval letters, and other supporting documents. The LDEQ also provided members of the Bayou Trepagnier Work Group an opportunity to comment on documents submitted to the LDEQ.

The RECAP MO-3 Report indicates that no unacceptable risks to human health or the ecological system at the site due to the levels of contaminants are present at the site. In review of this conclusion the Department considered the following factors:

- Methodology and calculations in assessing excess cancer risk and non-cancer hazard risks for the HHERA and ERA;
- Conformance to LDEQ RECAP Standards or USEPA Guidance for development of human health and ecological risk evaluations;
- The level of robustness in the data;
- Data quality and useability;
- Exposure Pathways and their applicability to site specific conditions;
- Selection of constituents of concern for human health and the ecological system
- Uncertainty Assessment for the HHERA and ERA; and
- Existing and future land use

The LDEQ has concluded that no further action is warranted for the sediments, dredge spoils, and adjacent soils in OU2 as well as all other OU1 media (i.e. dredge spoils and adjacent wetland soils outside of the Clean Corridor) not included in the OU1 Remedial Action.

Signed this 11 day of October 2010

By:


Cheryl Nolan
Assistant Secretary
Office of Environmental Services